DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
U.S. DEPARTMENT OF ENERGY

MISCELLANEOUS INVESTIGATIONS SERIES
MAP I–1884

Base from U.S. Geological Survey, 1961
Photorevised 1983
10,000-foot grid ticks based on Nevada coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 11, shown in blue
[1]Fenix & Scisson, Inc.

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology mapped in 1984–85

CORRELATION OF MAP UNITS

Units	Age	
Q1a, Q1b, Q1c, Q1ab	Holocene	QUATERNARY
UNCONFORMITY		
Q2b, Q2c, Q2bc	Pleistocene	QUATERNARY
UNCONFORMITY		
QTa	Pleistocene and Pliocene(?)	QUATERNARY AND TERTIARY(?)
UNCONFORMITY		
Ta	Pliocene(?)	TERTIARY
UNCONFORMITY		
Tvs	Pliocene to Oligocene	TERTIARY
UNCONFORMITY		
DZr		DEVONIAN TO LATE PROTEROZOIC

DESCRIPTION OF MAP UNITS

[A combined map symbol (Q1c+Q2bc) is used where two Quaternary map units are interspersed at such a small scale that separate mapping was impractical. The first unit predominates in areal extent. Where two stratigraphic units are commonly mapped as a combined unit, a condensed map symbol is used (Q1ab). Where a veneer of the younger unit masks, but does not completely conceal, the underlying unit, fractional symbols (Q2c/QTa) are used.]

Holocene alluvial deposits—Deposits of present drainage system. Holocene age is inferred on the basis of limited soil development and correlation with nearby areas (Hoover and others, 1981, p. 25)

Q1a **Alluvial deposits**—Gravel, gravelly sand, silty sand, and sandy silt in discontinuous beds and lenses; light brownish gray to light gray; poorly to moderately well sorted. Gravel is angular to subrounded, nonbedded to well bedded; clasts as large as 0.5 m in diameter. Unit occurs in bottoms of modern washes; braided channels and gravel bars are common. Maximum thickness probably less than 3 m. Except in some larger washes, most Q1a deposits are too narrow to be mapped separately and are combined with unit Q1b as Q1ab

Q1b **Alluvial deposits**—Gravel, gravelly sand, silty sand, and silt; light gray to light brownish gray; poorly to moderately well sorted; well to poorly bedded; unconsolidated; commonly occur as discontinuous beds and lenses. Gravel is angular to subrounded; includes sparse to common boulders less than 1 m in diameter. Boulders are locally abundant, occurring as trains and in patches. Unit forms fluvial terraces as much as 2 m above modern washes, as well as thin sheets and narrow fans downstream from the incised parts of some drainages; terrace surfaces are highly irregular; bar and swale topography and braided channels are common. Where topographic separation between units Q1b and Q1a is small, as in the eastern part of Rock Valley, unit Q1b locally includes thin pale-brown overbank silt deposits of unit Q1a. No pavement has developed on Q1b surfaces; soil development is commonly characterized by minor oxidation in the B horizon. Q1b deposits commonly are closely interspersed with channel deposits of Q1a which are too narrow to be mapped separately, and the two units are combined as unit Q1ab. Thickness probably 5 m or less

Q1ab **Alluvial deposits**—Combined map unit used where deposits of units Q1a and Q1b are so closely interspersed that the two units cannot be mapped separately. Q1ab deposits commonly consist of terrace remnants or thin sheets of Q1b closely interlaced with narrow channel deposits of unit Q1a

Q1c **Alluvial deposits**—Gravel, gravelly sand, and silty sand; light brownish gray to grayish brown; poorly to moderately well sorted; moderately well bedded to discontinuously bedded. Gravel is angular to subrounded; clasts commonly less than 0.3 m in diameter, but locally as large as 1 m in diameter. Unit forms terrace remnants 1–3 m above most washes and thin alluvial fan deposits that commonly overlie fans of unit Q2bc. Surface of unit Q1c is commonly smooth, in sharp contrast to Q1b. However, along some steep washes on the flank of Skull Mountain, where unit Q1c commonly contains abundant boulders, the surface is very irregular and bar and swale topography is preserved. Soil development consists of minor leaching of calcium carbonate in the upper part and a weakly developed carbonate horizon (stage I of Gile and others, 1966) in the lower part. Locally, processes such as soil creep or deflation have produced a weakly developed pavementlike lag deposit. Thickness 0–10+ m

Late and middle Pleistocene alluvial deposits—Subdivided into three map units in the Nevada Test Site (NTS) region by Hoover and others (1981) on the basis of relative age as indicated chiefly by relative topographic position, amount of dissection, and degree of soil development. Two of the three units are recognized in this quadrangle; unit Q2a has not been mapped here

Q2b **Alluvial deposits**—Gravel, gravelly sand, and sand; light gray and yellowish to grayish brown; weakly consolidated. Gravel is unsorted to moderately well sorted, nonbedded to well bedded, subangular to rounded; clasts commonly less than 0.5 m in diameter; matrix is sandy to silty. Sand is discontinuously to moderately well bedded, locally crossbedded, moderately well sorted; commonly gravelly and locally silty. Soil formed has a 3–5-cm light-brownish-gray vesicular A horizon composed largely of silt- and clay-sized material, a light-brown cambic B horizon, and a stage I to II carbonate horizon. Pavement is loosely packed to moderately well packed. Unit forms small inset terrace remnants 0.5–2.0 m below level of unit Q2c along some large washes, and also occurs as thin fan deposits that locally overlie, or are slightly inset into, extensive Q2c fans. Differs from unit Q2c by weaker soil development and generally lower topographic position. A minimum age of about 160,000 yr has been inferred for Q2b deposits on the basis of several age determinations made using the experimental uranium-trend method for similar samples from the Yucca Mountain area to the northwest (Swadley and others, 1984). Thickness 0–5+ m

Q2c **Alluvial deposits**—Gravel, gravelly sand, and silty sand; light gray, pinkish gray, and grayish brown; weakly to moderately well consolidated. Gravel is unsorted to moderately well sorted, poorly to moderately well bedded, angular to subrounded; includes boulders commonly 0.5 m and locally 1 m in diameter; matrix is sandy or silty. Sand is poorly to well bedded, locally crossbedded; occurs as discontinuous beds and lenses interbedded with gravel; locally gravelly and commonly silty. Unit forms extensive fans flanking bedrock hills, terrace deposits along Rock Valley and its larger tributaries, and thin veneers on eroded fans of unit QTa. Unit Q2c locally includes debris-flow deposits; remnants of a debris flow are well exposed along south bank of Rock Valley wash, 0.5–1.0 km east of western quadrangle border (Q2c mapped here as combined unit Q2bc). Soils of several ages have developed in Q2c deposits. The older soils typically have approximately 1 m of stage III to IV carbonate accumulation overlain by a pinkish-gray to pale-reddish-brown argillic B horizon and a 10–12-cm-thick vesicular A horizon of very pale brown eolian silt and clay. The younger soils consist of a stage II to III carbonate horizon less than 1 m thick, a light-brown cambic B horizon, and a 3–5-cm-thick vesicular A horizon. A densely packed and moderately well sorted desert pavement is common; a well-developed black varnish is typical on surface gravels that are derived from volcanic rocks. An age of 0.74 Ma has been inferred for the lower part of unit Q2c in the NTS area on the basis of its interbedded relationship with the lower part of an eolian sand unit that includes beds of the 0.74 Ma Bishop ash (Izett, 1982). Uranium-trend age determinations for soils developed in Q2c deposits exposed in the Yucca Mountain area yielded ages of about 270,000 yr (Swadley and others, 1984), which is inferred to be the minimum age of unit Q2c in this area. Thickness 0–10+ m

Q2bc **Alluvial deposits**—Combined map unit used where units Q2b and Q2c cannot be distinguished by topographic position or geomorphic form. Unit Q2b commonly occurs as fan deposits that are thinly distributed over, or closely interspersed with, areas of Q2c. Units are mapped separately in areas of incised drainage, where Q2b deposits are preserved as remnants of inset terraces (some too small to show at this map scale) adjacent to deposits of Q2c

QTa **Early Pleistocene and Pliocene(?) alluvial and colluvial deposits**—Largely unsorted cobble to boulder gravel that is nonbedded to poorly bedded and moderately to well cemented with carbonate; locally consists of moderately well bedded, poorly to moderately well sorted pebble to cobble gravel in a sandy matrix. Gravel is angular to subrounded; clasts more than a meter in diameter are locally common. Unit forms extensive fans flanking Skull Mountain, isolated rounded ridges and mounds along Rock Valley, and moderately dissected fans in larger valleys of the Specter Range. Fans along Skull Mountain commonly include deposits of unsorted, poorly bedded cobble and boulder colluvium in upper part; lower slopes of these fans are largely veneered with fan gravel of unit Q2c. Locally unit QTa occurs as pediment gravel that overlies Tertiary rocks at altitudes as much as 30 m above modern drainages. In the east-central part of the quadrangle, gravelly sand deposits that appear to be stratigraphically equivalent to typical QTa deposits are included in unit QTa. The lower part of these deposits is light-gray, nonbedded to well-bedded gravelly sand that commonly includes basalt boulders derived from outcrops on Skull Mountain. The upper part consists of pinkish-gray, crudely bedded gravelly sand that contains abundant well-rounded cobbles derived from the Horse Spring Formation (Miocene) and the rocks of Pavits Springs of Sargent and Stewart, 1971 (Oligocene and Miocene), as well as sparse basalt clasts. In Rock Valley these sandy deposits weather to form mostly flat surfaces covered with densely packed pavements that have a well-developed varnish; to the southeast in Mercury Valley, these deposits crop out as highly dissected ridges as much as 25 m above the modern drainages. Unit QTa deposited chiefly as debris flows, includes some stream alluvium

Soils developed in unit QTa typically consist of a stage III to IV carbonate horizon as thick as 2 m, commonly overlain by a thick silt-clay vesicular A horizon similar to that formed on soils of middle to late Pleistocene deposits. The surface of QTa deposits generally has a densely packed pavement that includes tabular fragments of pedogenic carbonate and opaline silica. This pavement locally is continuous with similar pavements developed on adjacent Q2c deposits. No age determinations have been made for unit QTa. A minimum age substantially older than 0.74 Ma is implied for unit QTa in the NTS area by the occurrence of QTa deposits that include a well-developed soil underlying unit Q2c. Maximum thickness unknown, but probably greater than 40 m in the NTS area

Ta **Tertiary alluvial deposits (Pliocene?)**—Interbedded gravel, gravelly sand, and sand; light gray to brownish gray, poorly to moderately well sorted, thick bedded to massive. Gravel consists of angular to rounded pebble- to boulder-sized clasts derived chiefly from Paleozoic formations. Unit is locally well cemented by dense light-brown microcrystalline to sparry calcite, which results in outcrops that break and weather across clasts, in contrast to outcrops of unit QTa that fracture and weather around clasts. In the western part of the quadrangle, unit Ta is poorly exposed and is commonly expressed as steep rubble-covered slopes and scattered resistant ledges of well-cemented gravel. In the eastern part, where unit is more dissected, exposures commonly include a series of 1–1.5-m-thick petrocalcic horizons developed in gravel beds. These horizons are well cemented by light-brown, microcrystalline calcite, and they crop out as resistant ledges on rubble-covered slopes. Along the divide between Mercury and Rock Valleys, unit Ta is capped by a thick petrocalcic zone of brown, dense, laminated carbonate that contains only a few rock clasts, but contains abundant nodules and plates of white opaline silica as thick as 8 cm that weather red to black. Unit Ta commonly occurs adjacent to ridges of Paleozoic rocks, especially where these rocks are truncated by faulting. Unit also occurs as thin deposits that overlie isolated fault blocks of Tertiary bedrock. Maximum thickness unknown, probably greater than 50 m

Tvs **Volcanic and sedimentary rocks, undivided (Pliocene to Oligocene)**—Tuffs, ash-flow tuffs, lava, sandstone, limestone, siltstone, and conglomerate. Mapped and described in more detail by Sargent and Stewart (1971)

DZr **Devonian to Late Proterozoic sedimentary rocks**—Dolomite, limestone, quartzite, sandstone, siltstone, claystone, and chert. These rocks were mapped and described by Sargent and Stewart (1971); stratigraphy of the Paleozoic and Precambrian rocks of the quadrangle is discussed by Burchfiel (1964)

Contact

Fault, showing dip—Dashed where probable, dotted where concealed. Bar and ball on downthrown side. Triangle and number indicate height of fault scarp in meters at location shown; triangle on upthrown side of scarp. Fault in bedrock shown only if fault offsets surficial deposits

Fault scarp or fault-line scarp along which younger unit has been deposited—Hachures on side of postfault deposit

Lineament—Indistinct linear alignment of vegetation or topography on aerial photograph; possibly fault related

Strike and dip of joint—Surfaces of joint commonly coated with secondary calcium carbonate

Inclined

Vertical

Trench excavated for fault study

Artificial fill

PURPOSE OF STUDY

The study of the surficial geology of the Specter Range NW quadrangle was undertaken in order to locate faults that displace Quaternary deposits in the Yucca Mountain region. Work was done in cooperation with the U.S. Department of Energy, Nevada Nuclear Waste Storage Investigations Project, as part of an evaluation of a potential high-level radioactive waste repository at Yucca Mountain, approximately 35 km to the northwest. Other surficial geologic maps published in the area are shown in the index.

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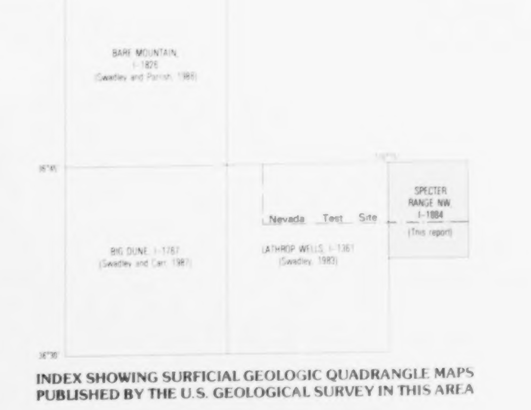

INDEX SHOWING SURFICIAL GEOLOGIC QUADRANGLE MAPS PUBLISHED BY THE U.S. GEOLOGICAL SURVEY IN THIS AREA

SURFICIAL GEOLOGIC MAP OF THE SPECTER RANGE NW QUADRANGLE, NYE COUNTY, NEVADA

By
W C Swadley and H. E. Huckins[1]

1989

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MAP I-1994

DEPARTMENT OF THE INTERIOR
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GEOLOGIC MAP OF THE SURFICIAL DEPOSITS OF THE JACKASS FLATS QUADRANGLE, NYE COUNTY, NEVADA

By W C Swadley and D. L. Hoover

Prepared in cooperation with the
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